

What is claimed is:

1. A method of accumulating articles into plural batches, wherein each completed batch comprises a plurality of articles which have been selected from a stream of articles in accordance with at least one predetermined selection criterion, said method comprising the steps of:

identifying at least one article characteristic for each article in said stream of articles, said at least one article characteristic comprising at least one of article type and article weight;

using an automated system to keep track of the articles in said stream of articles according to said at least one article characteristic and to control allocation of the articles for making up the batches in accordance with said at least one predetermined selection criterion, said batches comprising at least two different types of batches, each of which is allocated in accordance with at least one selection criteria which differs from that of another of said different types of batches; and

using a sorting arrangement linked to said automated system to select articles from said stream of articles and to accumulate said articles in a series of said different types of batches, the articles being selected for accumulation in a given batch in accordance the allocation established by said automated system; and

delivering said different types batches of articles after accumulation thereof has been completed.

2. A method according to claim 1, wherein said allocation of articles is performed contemporaneously in accordance with at least two different sets of batching criteria so as to produce batches having different predetermined weight ranges.

3. A method according to claim 2, wherein the different sets of batching criteria are prioritized differentially.

4. A method according to claim 1, wherein different kinds of articles are allocated into batches contemporaneously, each batch comprising only one kind of article.

5. A method according to claim 1, wherein different kinds of articles are allocated into batches contemporaneously, at least two types of articles being allocated to each batch.

6. A batching system for accumulating articles into plural batches, wherein each completed batch comprises a plurality of articles which have been selected from a stream of articles in accordance with at least one predetermined selection criterion, said system comprising:

means for identifying at least one article characteristic for each article in said stream of articles, said at least one article characteristic comprising at least one of article type and article weight;

a computer for keeping track of the articles in said stream of articles according to said at least one article characteristic and to control allocation of the articles to make up the batches in accordance with said at least one predetermined selection criterion, said batches comprising at least two different types of batches, each of which allocated in accordance with at least one selection criteria which differs from that of other of said different types of batches; and

a sorting arrangement linked to said computer for selecting articles from said stream of articles and for accumulating said articles in a series of said different types of batches, the articles being selected for accumulation in a given batch in accordance the allocation established by said computer; and

means for delivering said different types batches of articles after accumulation thereof has been completed.

7. A batching system according to claim 6, further comprising:

means for serially supplying articles to a weighing station at which the weights of the articles are assessed; and wherein said at least one selection criterion includes article weight.

8. A batching system according to claim 6, wherein the computer is adapted to differentially prioritize the different batching criteria.

9. A batching system according to claim 6, wherein the computer is adapted to allocate different types of articles into batches contemporaneously with each batch comprising only one kind of article.

10. A batching system according to claim 6, wherein the computer is adapted to allocate different types of articles into batches contemporaneously with at least two types of articles being allocated to each batch.

11. A method of accumulating articles having different weights into plural batches wherein each completed batch comprises a plurality of articles and has a sum weight within a predetermined weight range, said method comprising the steps of:

establishing a historical frequency distribution of article weights; and

using a computer to keep track of the articles according to the weight of each article and to control allocation of the articles to make up the batches in accordance with said historical frequency distribution of article weights.

12. A method according to claim 11, comprising the further steps of:

calculating a factor for each incomplete batch which is related to the completion probability that, by allocation of an article to said batch, the batch can be completed by allocation of at least one succeeding article to said batch, said factor being based upon said historical frequency distribution, upon the sum weight of articles in the incomplete batch and upon the weight of the article to be allocated; and

effecting allocation of an article to a respective batch in dependence upon a comparison of the factors calculated for each batch.

13. A method according to claim 12, wherein said calculating step comprises the further steps of:

deriving said completion probability from the predetermined weight range and from the current sum weight of articles in the respective incomplete batch; and

determining how said probability would change if the article to be allocated were to be allocated to that batch.

14. A method according to claim 12, said calculating step comprises the further steps of:

deriving a difference between the predetermined weight range for the completed batch and the current sum weight of the respective batch,

deriving from said historical frequency distribution the various combinations of article weights which would sum to said difference, and

deriving the corresponding probabilities for such combinations from the historical frequency distribution.

15. A method according to claim 12, wherein said calculating step comprises the further steps of:

establishing in a computer database functions indicating the probabilities of completing an incomplete batch by at least one succeeding article having a weight in accordance with the historical frequency distribution, and

accessing said database, when an allocation decision is to be made, to derive probability values relating to weight required for completing an incomplete batch if the article that is to be allocated were allocated to that batch.

16. A method according to claim 11, wherein said step of establishing a historical frequency distribution is performed in a manner taking into account variations in the weight distribution of the articles to be batched.

17. A method according to claim 11, comprising the further step of modifying the established historical frequency distribution to take into account article weight distribution variations only when a statistically significant number of articles exhibit such weight distribution variations.

18. A method according to claim 11, wherein said allocation of the articles is performed in additional dependence upon the number of articles to be allocated to the respective batches.

19. A method according to claim 12, wherein said allocation of the articles is performed in additional dependence upon the existence of any partly completed batch which repeatedly fails to have an article allocated thereto.

20. A method according to claim 19, wherein the probability factor calculation step comprises the step of modifying the calculation to increase the probability calculated for any partly completed batch which repeatedly fails to have an article allocated thereto.

21. A method according to claim 20, wherein said modifying step is performed so as to increase the probability calculated by a modification factor which increases as a function of time.

22. A method according to claim 12, wherein said probability factor is given a weight in allocation of articles which is different for completion degrees of completion of the batches.

23. A method according to claim 22, comprising the step of initially allocating articles to batches indiscriminately until partly completed batches reach one of a predetermined sum weight and a predetermined number of articles, after which said effecting allocation of an article to a respective batch in dependence upon a comparison of the factors calculated for each batch is commenced.

24. A method according to claim 22, wherein said probability factor is given a greater weight in allocation of articles for completion of batches than prior thereto.

25. A method according to claim 11, comprising the further steps of:  
monitoring batch weights of completed batches, and  
adjusting allocation of articles to batches in dependence on the monitored batch weights so as to insure that average batch weight is at least a predetermined amount.

26. A method according to claim 11, wherein said allocation in accordance with the historical frequency distribution is performed using only a portion of said historical frequency distribution.

27. A method according to claim 11, wherein said allocation of articles to batches is performed contemporaneously in accordance with at least two different sets of batching criteria so as to produce batches having different predetermined weight ranges.

28. A method according to claim 27, wherein the different sets of batching criteria are prioritized differentially.

29. A method according to claim 11, wherein different kinds of articles are allocated into batches contemporaneously, each batch comprising only one kind of article.

30. A method according to claim 11, wherein different kinds of articles are allocated into batches contemporaneously, at least two types of articles being allocated to each batch.

31. A method according to claim 30, wherein different kinds of articles are allocated into batches sequentially, one type of article at a time, and at least two types of articles being allocated to each batch.

32. A method according to claim 31, wherein the different types of articles are allocated to the different batches with mutually different delivery sequences.

33. A method according to claim 31, wherein the allocation of plural articles of the same type to the batches is effected so that the plural articles of the same type in each batch have an approximately uniform size or weight.

34. A method according to claim 11, wherein the allocating of articles is effected so that said predetermined weight range is subject to a predetermined target weight distribution.

35. A method according to claim 12, comprising the further step of supplying the articles into a distribution system having a plurality of batching stations and a selector operable to move an article into a selected batching station, wherein article weights are assessed at input to the distribution system and movement of articles into the distribution system is tracked to enable the selector to move an article to a particular batching station in dependence upon the calculated probability factors for the respective article.

36. A method according to claim 35, wherein said assessing of article weights is performed using a weighing device.

37. A method according to claim 36, wherein said article weights are assessed at a weigh station located upstream of all of the batching stations and allocation decision based on probability factor comparisons performed prior to departure of the articles from the weighing station.

38. A batching system for accumulating articles having different weights into plural batches, wherein each completed batch comprises a plurality of articles and has a sum weight within a predetermined weight range, said system comprising:

means for establishing a historical frequency distribution of article weights; and

a computer to keep track of the articles according to the weight of each article and to control allocation of the articles to make up the batches in accordance with said historical frequency distribution of article weights.

39. A batching system according to claim 38, further comprising:

means for serially supplying articles to a weighing station at which the weights of the articles are assessed;

means for serially moving the articles from the weighing station into a distribution system have a plurality of batching stations and a selector that is operable to move each article into a selected batching station;

wherein said computer is operable to control operation of the selector for controlling said allocation of articles.

40. A method of accumulating articles having different weights into plural portions within a plurality of portioning bins, wherein each completed portion comprises a plurality of articles and has a target weight within a predetermined weight range, said method comprising the steps of:

individually weighing each article in a stream of articles;

keeping track of the weights of a plurality of weighed articles and using said weights for determining a factual weight distribution of the articles in said stream of articles,

based upon said factual weight distribution, statistically calculating the probabilities of each new article being successfully added to each of the portioning bins so as to produce a portion of weight within a predetermined weight range together with subsequent articles, and

based upon the calculated probabilities, performing a suitability analysis for determining which of the plurality of portioning bins to which delivery of each new article is best suited for producing such a portion, and diverting each new article from said stream of articles into one of the portioning bins based upon said suitability analysis.

40. A system for accumulating articles having different weights into plural portions within a plurality of portioning bins, wherein each completed portion comprises a plurality of articles and has a target weight within a predetermined weight range, said system comprising:

a weigher for individually weighing each article in a stream of articles;

a computer control unit having means for keeping track of the weights of a plurality of weighed articles and for using said weights for determining a factual weight distribution of the articles in said stream of articles, based upon said factual weight distribution, for statistically calculating the probabilities of each new article being successfully added to each of the portioning bins so as to produce a portion of weight within a predetermined weight range together with subsequent articles, and based upon the calculated probabilities, for performing a suitability analysis for determining which of the plurality of portioning bins to which delivery of each new article is best suited for producing such a portion, and

article diverting means coupled to said control unit for diverting each new article from said stream into one of the portioning bins based upon said suitability analysis.